

CLAIMS

What is claimed is:

1. A disc usable with respect to a recording and/or reproducing apparatus, the disc comprising:
 - a data area in which user data is recorded; and
 - at least one of a lead-in area and a lead-out area adjacent the data area and which comprises a temporary defect management area which comprises temporary defect information and temporary defect management information regarding the user data recorded in the data area and which is accessible by the recording and/or reproducing apparatus to perform defect management on the disc.
2. The disc of claim 1, wherein:
 - the data area further comprises additional user data recorded in the data area in an additional recording operation other than a recording operation during which the user data was recorded in the data area, and
 - the temporary defect management area further comprises additional temporary defect information and additional temporary defect management information recorded in the temporary defect management area and corresponding to the additional user data recorded in the additional recording operation.

3. The disc of claim 1, wherein the temporary defect information comprises information indicating a position of a defective area of the data area in which a corresponding unit of user data is recorded.

4. The disc of claim 3, further comprising a replacement area in which is recorded the unit of the user data so as to be a substitute area for the defect area, wherein the temporary defect information contains information indicating a position of the replacement area.

5. The disc of claim 1, wherein the temporary defect management area comprises a temporary defect information area, and the temporary defect information is recorded in the temporary defect information area.

6. The disc of claim 1, wherein the temporary defect management area comprises a temporary defect management information area, and the temporary defect management information is recorded in the temporary defect management information area.

7. The disc of claim 1, wherein the corresponding temporary defect information and temporary defect management information are recorded as a pair of information in the temporary defect management area.

8. The disc of claim 1, further comprising a defect management area that is present in at least one of the lead-in area and the lead-out area,

wherein, during finalization of the disc, a last temporary defect information and a last temporary defect management information, which are last recorded in the temporary defect management area, are recorded as final defect information and defect management information in the defect management area.

9. A method of managing disc defects in a disc, the disc comprising a data area and a temporary defect management area in one of a lead-in and a lead-out area, the method comprising:

recording temporary defect information in the temporary defect management area, the temporary defect information comprising defect information regarding data recorded in the data area according to a recording operation; and

recording temporary defect management information in the temporary defect management area, the temporary defect management information comprising management information for managing the temporary defect information.

10. The method of claim 9, further comprising:

repeating the recording the temporary defect information and the recording the temporary defect management information for each unit of the data recorded during a plurality of recording operations; and

recording a last recorded temporary defect management information and a last temporary defect information in a defect management area that is present in at least one of the lead-in area and the lead-out area.

11. The method of claim 9, wherein the recording the last recorded temporary defect management information is performed during finalization of the disc.

12. The method of claim 9, wherein the recording the temporary defect information comprises recording in the temporary defect information defect position information indicating a position of a defective area of the data area.

13. The method of claim 11, wherein the recording the temporary defect information further comprises recording in the temporary defect information replacement position information indicating a position of a replacement area that includes a portion of the data also recorded in the defective area so as to be a substitute for the defective area.

14. The method of claim 9, wherein:
the temporary defect information comprises multiple units of temporary defect information,
the temporary defect management area further comprises a temporary defect information area, and

the recording the temporary defect information further comprises sequentially recording the units of the temporary defect information in the temporary defect information area starting from a start of the temporary defect information area.

15. The method of claim 9, wherein:

the temporary defect management information comprises multiple units of temporary defect management information,

the temporary defect management area further comprises a temporary defect management information area, and

the recording the temporary defect management information comprises sequentially recording the units of the temporary defect management information in the temporary defect management information area, starting from an end of the temporary defect management information area.

16. The method of claim 9, wherein:

the temporary defect information comprises multiple units of temporary defect information,

the temporary defect management area further comprises a temporary defect information area and a temporary defect management information area,

the temporary defect management information comprises multiple units of temporary defect management information, and

the recording the temporary defect information and the recording the temporary defect management information comprise sequentially recording corresponding units of the temporary defect information and temporary defect management information as a pair of information in corresponding units of temporary management information, starting from a start of the temporary defect management area.

17. The method of claim 9, wherein:

the temporary defect information comprises multiple units of temporary defect information,

the temporary defect management area further comprises a temporary defect information area and a temporary defect management information area,

the temporary defect management information comprises multiple units of temporary defect management information, and

the recording the temporary defect information and the recording the temporary defect management information comprise sequentially recording corresponding temporary defect information and temporary defect management information as a pair of information, starting from an end of the temporary defect management area.

18. The method of claim 9, wherein the recording the temporary defect information further comprises:

recording the data in predetermined units of the data;

verifying the recorded data to detect a defective area of the disc in which a defect exists;
if a defective area is detected, storing first temporary defect information in a memory, the first temporary defect information comprising information pointing to a position of the defective area and information pointing to a replacement area that contains a unit of data recorded in the defective area so as to be a substitute area for the defective area;

repeating the recording the data through the storing in the memory at least once; and
reading at least the first temporary defect information stored in the memory and
recording the read information as the first temporary defect information in the temporary defect management area.

19. A recording and/or reproducing apparatus for use with a disc having a data area and a temporary defect management area in at least one of a lead in and a lead out area, the apparatus comprising:

a recording/reading unit that records data on and/or reads data from the data area of the disc; and

a controller that controls the recording/reading unit to record temporary defect information in the temporary defect management area, the temporary defect information comprising defect information regarding the data recorded in the data area according to a recording operation, and to record temporary defect management information in the temporary defect management area, the temporary defect management information comprising management information for managing the temporary defect information.

20. The recording and/or reproducing apparatus of claim 19, wherein the controller further controls the recording/reading unit:

to record additional data in the data area according to another recording operation,

to record additional temporary defect information and additional temporary defect management information in the temporary defect management area corresponding to the additional data recorded according to the additional recording operation, and

during finalization of the disc, to record a last recorded temporary defect information and a last recorded temporary defect management information in a defect management area which is present in at least one of the lead-in area and the lead-out area of the disc.

21. A recording and/or reproducing apparatus for use with a disc having a data area and a temporary defect management area in one of a lead-in and a lead-out area, the recording and/or reproducing apparatus comprising:

a recording/reading unit that records data on or reads data from the data area of the disc; and

a controller that controls the recording/reading unit to

record first temporary defect information in the temporary defect management area, the first temporary defect information comprising defect information regarding a first unit of the data recorded in the data area according to a first recording operation,

record first temporary defect management information in the temporary defect management area, the first temporary defect management information comprising defect management information for managing the first temporary defect information,

record second temporary defect information in the temporary defect management area, the second temporary defect information comprising defect information regarding a second unit of the data recorded in the data area according to a second recording operation, and

record second temporary defect management information in the temporary defect management area, the second temporary defect management information comprising defect management information for managing the second temporary defect information.

22. The recording and/or reproducing apparatus of claim 21, wherein the controller further controls the recording/reading unit to record additional units of the data in the data area while increasing an index given to each additional recording operation, temporary defect information, and temporary defect management information, and to record a last recorded temporary defect management information and a last recorded temporary defect information in a defect management area included in at least one of the lead-in area and the lead-out area of the disc.

23. The recording and/or reproducing apparatus of claim 21, wherein:

the controller further controls the recording/reading unit to record last data in the data area according to a last recording operation and to record final defect management information and final defect information in a defect management area, the final defect information and the final defect management information respectively comprising a last recorded temporary defect information and a last recorded temporary defect management information regarding the last data recorded according to the last recording operation, and

the defect management area is present in at least one of the lead-in area, the lead-out area, and an outer area of the disc.

24. The recording and/or reproducing apparatus of claim 21, wherein the controller further controls the recording/reading unit to sequentially record the temporary defect information in a temporary defect information area of the temporary defect management area, starting from a start of the temporary defect information area.

25. The recording and/or reproducing apparatus of claim 21, wherein the controller further controls the recording/reading unit to sequentially record the temporary defect management information in a temporary defect management information area of the temporary defect management area, starting from an end of the temporary defect management information area.

26. The recording and/or reproducing apparatus of claim 21, wherein the controller further controls the recording/reading unit to sequentially record temporary management information comprising a corresponding pair of the temporary defect information and temporary defect management information in the temporary defect management area, starting from a start of the temporary defect management area.

27. The recording and/or reproducing apparatus of claim 21, wherein the controller further controls the recording/reading unit to sequentially record temporary management information comprising a corresponding pair of the temporary defect information and temporary defect management information in the temporary defect management area, starting from an end of the temporary defect management area.

28. The recording and/or reproducing apparatus of claim 21, further comprising a memory,

wherein the controller further

controls the recording/reading unit to record the data on the disc in predetermined units of data according to a predetermined recording operation,

verifies the recorded units of data to detect a defective area of the disc in which a defect exists,

creates defective position information pointing to a defective area and replacement position information pointing to a replacement area that is a substitute area for the defective area,

stores the created defective position and replacement position information as temporary defect information in the memory,

controls the recording/reading unit to record an additional unit of the data after the defective area according to a further recording operation,

reads the temporary defect information from the memory after completion of the recording of the additional unit of the data according to the further recording operation, and

controls the recording/reading unit to record the read temporary defect information in the temporary defect management area.

29. The disc of claim 5, wherein the temporary defect management area further comprises a temporary defect management information area other than the temporary defect information area, and the temporary defect management information is recorded in the temporary defect management information area.

30. The disc of claim 7, wherein the corresponding temporary defect information and temporary defect management information are recorded as temporary management information in adjacent units in the temporary defect management area.

31. The disc of claim 30, wherein:

additional user data is recorded in the data area,

additional temporary defect information and additional temporary defect management information corresponding to the additional user data is recorded as additional temporary management information in adjacent units in a second area of the temporary defect management area, and

the temporary management information is recorded in a first area of the temporary defect management area other than the second area.

32. A storage medium usable with respect to a recording and/or reproducing apparatus, the storage medium comprising:

a data area comprising user data; and

a management area other than the data area and which comprises a temporary defect management area comprising temporary defect information regarding the user data recorded in the data area and which is accessible by the recording and/or reproducing apparatus to perform defect management on the disc,

wherein the storage medium is a write-once storage medium having a property which prevents, after the data is recorded on an area of the storage medium, new data from being written to the area of the storage medium.

33. The storage medium of claim 32, wherein the management area further comprises a defect management area other than the temporary defect management area and comprising the temporary defect information usable by the recording and/or reproducing apparatus to perform the defect management on the storage medium.

34. The storage medium of claim 33, wherein:
the data area further comprises additional user data,
additional temporary defect information corresponding to the additional user data is recorded as additional temporary management information in the temporary defect management area,
the additional temporary defect information further comprises the temporary defect information, and
the defect management area comprises the additional temporary defect information.

35. A storage medium usable with respect to a recording and/or reproducing apparatus, the storage medium comprising:
a data area comprising user data and additional user data recorded in an area other than an area in which the user data is recorded; and

a management area other than the data area and which comprises a temporary defect management area comprising temporary defect information regarding the user data recorded in the data area, and additional temporary defect information recorded in an area other than an area in which the temporary defect information is recorded,

wherein the additional temporary defect information comprises defect information corresponding to the additional user data and to the user data and is accessible by the recording and/or reproducing apparatus to perform defect management on the disc.

36. The storage medium of claim 35, wherein the temporary defect management area further comprises:

temporary defect management information usable by the recording and/or reproducing apparatus to manage the temporary defect information, and

additional temporary defect management information usable by the recording and/or reproducing apparatus to manage the additional temporary defect information.

37. The storage medium of claim 36, wherein:

the temporary defect information and the temporary defect management information are recorded as temporary management information in adjacent units in the temporary defect management area,

the additional temporary defect information and the additional temporary defect management information are recorded as additional temporary management information in adjacent units in the temporary defect management area, and

the temporary management information is recorded in an area of the temporary defect management area other than an area in which the additional temporary management information is recorded.

38. The storage medium of claim 35, further comprising a further area comprising replacement data corresponding to a portion of the user data recorded in a defective portion of the data area,

wherein one of the temporary defect information and the additional the temporary defect information comprises a defect position information relating to a position of the defective portion and replacement position information relating to a position of the replacement portion.

39. The storage medium of claim 35, wherein the management area further comprises a defect management area other than the temporary defect management area and comprising one of the temporary defect information and the additional temporary defect information usable by the recording and/or reproducing apparatus to perform the defect management on the disc.

40. The storage medium of claim 39, wherein:

the additional temporary defect information includes the temporary defect information,
and

the defect management area comprises the additional temporary defect information.

41. A recording and/or reproducing apparatus for use with a storage medium having a data area and a management area in an area other than the data area and which includes a temporary defect management area, the recording and/or reproducing apparatus comprising:
a pickup unit that transfers data with respect to the data area; and
a controller that controls the pickup unit to transfer the data with respect to the data area, and to transfer temporary defect information with respect to the temporary defect management area, the temporary defect information comprising defect information regarding the data recorded in the data area according to a recording operation and which the controller uses to perform defect management with respect to the storage medium,
wherein the storage medium is a write-once storage medium having a property which prevents, after the data is recorded on an area of the storage medium, new data from being written to the area of the storage medium.

42. The recording and/or reproducing apparatus of claim 41, wherein the controller further controls the pickup unit to transfer additional data with respect to an area of the data area other than an area in which the data is recorded, and to record additional temporary defect information corresponding to the additional data in the temporary defect management area.

43. The recording and/or reproducing apparatus of claim 41, wherein the controller further transfers temporary defect management information with respect to the temporary defect management area, the temporary defect management information comprising management information used by the controller for managing the temporary defect information.

44. The recording and/or reproducing apparatus of claim 43, wherein the controller controls the pickup unit to transfer the temporary defect information and the temporary defect management information to be recorded as temporary management information in adjacent units in the temporary defect management area.

45. The recording and/or reproducing apparatus of claim 43, wherein:
the controller further controls the pickup unit to transfer additional data with respect to the data area, and to transfer additional temporary defect information and additional temporary defect management information corresponding to the additional data and which is recorded as additional temporary management information in adjacent units in a second area of the temporary defect management area, and

the temporary management information is recorded in a first area of the temporary defect management area other than the second area.

46. The recording and/or reproducing apparatus of claim 41, wherein:

the controller further controls the pickup unit to transfer replacement data corresponding to the data recorded in a defective portion of the data area with respect to a further area of the data area, and

the temporary defect information comprises a defect position information relating to a position of the defective portion and replacement position information relating to a position of the replacement portion.

47. The recording and/or reproducing apparatus of claim 41, wherein the management area further comprises a defect management area other than the temporary defect management area, and the controller controls the pickup unit to additionally transfer the temporary defect information with respect to the defect management area.

48. The recording and/or reproducing apparatus of claim 47, wherein:

the controller further controls the pickup unit to transfer additional data with respect to the data area, and to transfer additional temporary defect information corresponding to the additional data and which is recorded as additional temporary management information in the temporary defect management area,

the additional temporary defect information further comprising the temporary defect information, and

the defect management area comprises the additional temporary defect information.

49. A computer readable medium encoded with processing instructions for implementing a method of transferring data with respect to a storage medium performed by a computer, the storage medium having a data area and a management area in an area other than the data area and which includes a temporary defect management area, the method comprising:

controlling a pickup unit to transfer data with respect to the data area;

obtaining temporary defect information comprising defect information regarding the data recorded in the data area according to a recording operation and which is used to perform defect management with respect to the storage medium;

obtaining temporary defect management information used to manage the temporary defect information; and

controlling the pickup unit to transfer the temporary defect information and the temporary defect management information with respect to the temporary defect management area.

50. The computer readable medium of claim 49, wherein the method further comprises transferring additional data with respect to an area of the data area other than an area in which the data is recorded, and transferring additional temporary defect information corresponding to the additional data with respect to an area of the temporary defect management area other than an area in which the temporary defect information is recorded.

51. The computer readable medium of claim 49, wherein the method further comprises controlling the pickup unit to transfer the temporary defect information and the temporary defect management information to be recorded as temporary management information in adjacent units in the temporary defect management area.

52. The computer readable medium of claim 51, wherein:
the method further comprises controlling the pickup unit to transfer additional data with respect to the data area, and to transfer additional temporary defect information and additional temporary defect management information corresponding to the additional data and which is recorded as additional temporary management information in adjacent units in a second area of the temporary defect management area, and

the temporary management information is recorded in a first area of the temporary defect management area other than the second area.

53. The computer readable medium of claim 49, wherein:
the method further comprises controlling the pickup unit to transfer replacement data corresponding to a portion of the data recorded in a defective portion of the data area with respect to a further area of the data area, and

the temporary defect information comprises a defect position information relating to a position of the defective portion and replacement position information relating to a position of the replacement portion.

54. The computer readable medium of claim 49, wherein the management area further comprises a defect management area other than the temporary defect management area, and the method further comprises controlling the pickup unit to additionally transfer the temporary defect information with respect to the defect management area.

55. The computer readable medium of claim 54, wherein:
the method further comprises controlling the pickup unit to transfer additional data with respect to the data area, and to transfer additional temporary defect information corresponding to the additional data and which is recorded as additional temporary management information in the temporary defect management area,

the additional temporary defect information further comprising the temporary defect information, and

the defect management area comprises the additional temporary defect information.